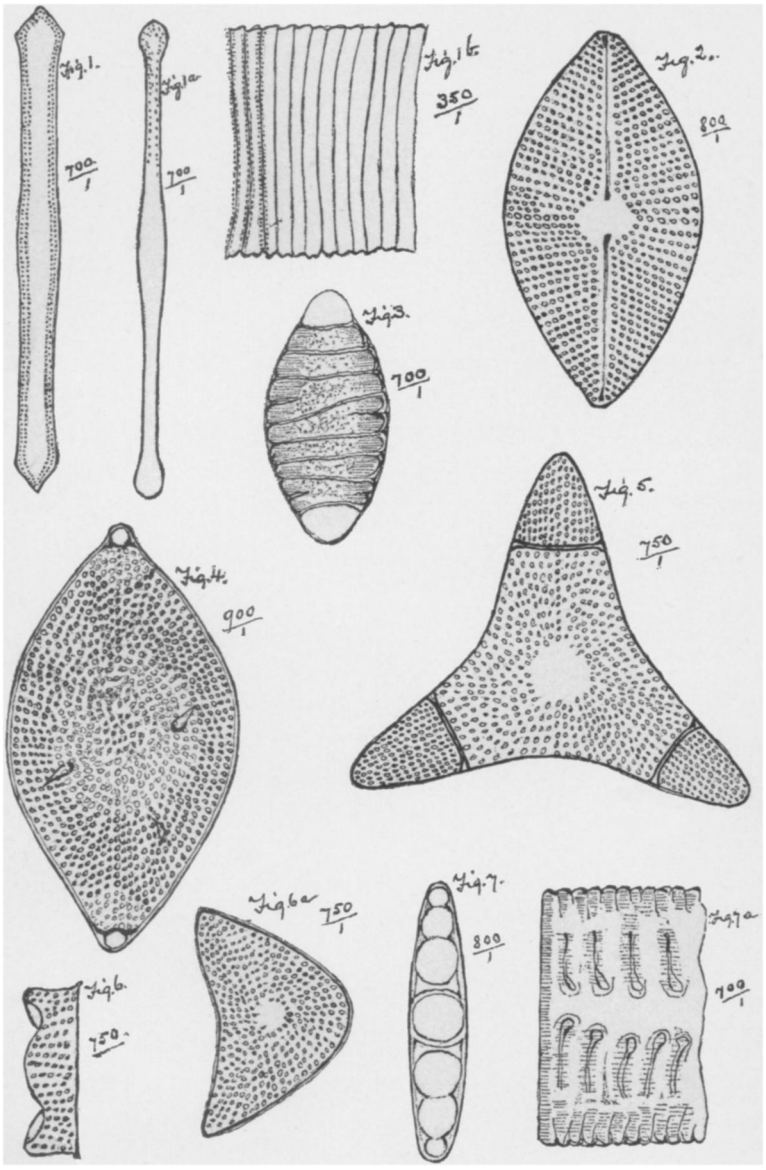

E. A. S. ad. nat. delin. 1889.

Diatoms from Atlantic City, N. J.

By C. HENRY KAIN and E. A. SCHULTZE.

On a Fossil Marine Diatomaceous Deposit from Atlantic City, N. J.

By C. Henry Kain and E. A. Schultze.

(Plate LXXXIX).

In sinking the second artesian well at Atlantic City, N. J., there has recently been discovered a fossil diatomaceous deposit of exceeding interest, not only to the student of diatoms, but to the geologist as well. By comparing the species found in it with those found in the famous deposits of Maryland and Virginia, a striking similarity will be observed. It is not the purpose of the present paper, however, to deal with the general geological results, especially as Mr. Lewis Woolman, the discoverer of the deposit, will make a full report to the Philadelphia Academy of Natural Sciences, upon the completion of the well. Mr. Woolman made a report upon the geological results observed in sinking the first well, which was begun in 1886, but, desiring to make a more accurate examination of the character of the successive strata, when the second well was contemplated he made arrangements to obtain a complete series of earth specimens. In a stratum of clay which was struck at a depth of 387 feet, he discovered diatoms, and, at his request, the investigation, of which this is a record, was immediately undertaken with a view of determining the species found.

Thus far, the diatoms have been found in a series of six clay beds occurring between the depths of 387 and 638 feet. These beds are separated by layers of sand in which no diatoms occur. The diatoms found in the upper stratum are few in number, generally small in form and much broken. At a depth of 406 feet the deposit is much richer, and several interesting species not found in the lower strata are fairly plentiful, such as *Dimeregramma Nova Cæsaræa*, *Auliscus spinosus*, and *Rhabdonema Atlanticum*. *Triceratium semicirculare* is particularly abundant at this depth, although it is also found to some extent in the deeper strata. The richest portion of the deposit, however, is at a depth of 550 feet. Here occurs for the first time a very curious new form, which we have provisionally called *Biddulphia Brittoniana*, although Prof. H. L. Smith is doubtful whether it is not really a new genus. A further examination of other specimens will be

necessary to determine its true character. Here also we find the deposit rich in specimens of *Biddulphia Tuomeyi*, *Biddulphia elegans* and several species of *Rhaphoneis*. Not only is the deposit much richer at this depth, but the forms are also far more robust than in the upper strata. Below 550 feet the diatoms become fewer and less interesting, until at a depth of 638 feet only a few of the larger species of *Coscinodiscus* may be found.

After the well had reached a depth of about 800 feet, a severe storm destroyed the apparatus employed in sinking it, but the boring will probably be resumed, and it is intended to make a complete microscopical examination of the remaining strata. The well will probably reach a depth of 1,150 feet, the first well having been completed at about that depth.

In examining the list of species, it will be observed that there are a few fresh water forms. These are not plentiful, but are sufficient to indicate that the deposits were made within the reach of fresh water influences, possibly within or not far from a large estuary. While, as before stated, the similarity between the species in this and in the deposits of Maryland and Virginia is remarkable, it is also a curious fact that the characteristic species of the Nottingham, Md. deposit—*Heliopelta Ehrenbergii* and *Craspedodiscus elegans*—are conspicuously absent. The presence of *Hydrosera triquetra* is also rather interesting, as this is usually supposed to be peculiar to tropical seas.

The following is a list of the species thus far observed:

Actinocyclus Ehrenbergii, Ralfs. Several varieties.

A. interpunctatus, Brightw. Rare.

A. Ralfsii, W. Sm.

ACTINODISCUS ATLANTICUS, n. sp. Kain and Schultze.

Greville, who constituted this genus, described and figured but one species, *A. Barbadensis*. He gives the following generic characteristics: "Frustules free, disk-shaped; valves granular with a central nucleus, and numerous (15) linear, smooth, rays extending from it to the margin." In this deposit the specimens differ in the following respects from Greville's figure. The central nucleus is much smaller; the rays extend nearer to the centre of the valve and are either four, five or six in number. Near the circumference each ray has a strong rib extending for a short

distance along its centre, and the spaces between the rays are slightly undulating.

Actinoptychus areolatus, Ehrb.

A. splendens (Ehrb.), Grun., *var. Halionyx*, Grun. Several varieties.

A. undulatus, Ehrb.

A. vulgaris, Schumann, *var. Virginica*, Grun. Several varieties.

Amphitetras minuta, Grev. Rare.

Asterolampra Marylandica, Ehrb. Rare.

Aulacodiscus Crux, Ehrb. Two varieties.

Auliscus pruinosus, Bailey.

A. spinosus, T. Christian. A. Schmidt (Atlas Pl. 125, fig. 2) speaks of this as doubtfully an *Auliscus*, and Prof. H. L. Smith considers it rather more closely allied to *Glyphodiscus*, although he thinks the two genera might with propriety be united.

Biddulphia aurita (Lyngb.), Breb.

B. Baileyi, W. Sm.

BIDDULPHIA BRITTONIANA, Kain and Schultze, n. sp.

A figure and description of this singular new form will be given in a future paper.

BIDDULPHIA COOKIANA, Kain and Schultze, n. sp.

Valve orbicular-lanceolate; two processes at extremities of longitudinal axis; three central spines; elevation at the centre and apices slight; striæ moniliform, radiate. (Plate LXXXIX. Fig. 4).

We take pleasure in naming this beautiful form after Prof. Geo. H. Cook, State Geologist of New Jersey.

B. decipiens, Grun. Rare.

B. elegantula, Grev. A careful study of the many varieties of this diatom found in the deposit, and a comparison of them with *B. Tuomeyi*, also found in it, make it seem probable that they are only varieties of the same species.

B. pulchella, Gray. Rare.

B. rhombus (Ehrb.), W. Sm.

B. seticulosa, Grun.

B. Tuomeyi, Bailey.

B. turgida (Ehrb.), W. Sm.

BIDDULPHIA WOOLMANII, Kain and Schultze, n. sp.

Valve elliptical, with undulating margin caused by from 7 to 10 transverse elevations separated by costæ, the summits of which are finely punctate, and the marginal inclinations finely striate; processes globular. (Plate LXXXIX. Fig. 3).

Cocconema lanceolatum, Ehrb. Rare.

Coscinodiscus Argus, Ehrb.

C. asteromphalus, Ehrb.

C. concavus, Ehrb.

C. eccentricus, Ehrb.

C. gigas, Ehrb.

C. isoporus, Ehrb.

C. Lewisianus, Grev. Rare.

C. lineatus, Ehrb.

C. Nottinghamensis, Grun. Rare.

C. Oculis Iridis, Ehrb.

C. perforatus, Ehrb.

C. radiatus, Ehrb.

C. rhombicus, Castracane. Rare.

C. robustus, Grev.

C. Senarius, A. S.

C. symmetricus, Grev.

Craspedodiscus coscinodiscus, Ehrb.

C. coscinodiscus, Ehrb., var. *Nankoorensis*, Grun.

Cymatopleura Solea, W. Sm.

Dicladia capreolus, Ehrb. Rare.

DIMEREGRAMMA NOVÆ-CÆSARÆA, Kain and Schultze, n. sp.

Valve linear with slight central inflation and acute apices; striæ moniliform, marginal; intermediate free space broad. (Plate LXXXIX, Figs. 1, 1b).

D. NOVÆ-CÆSARÆA, var. OBTUSA, Kain and Schultze, n. var.

Valve linear with central inflation and obtuse constricted extremities; striæ moniliform, marginal, broad intermediate free space. (Plate LXXXIX. Figs. 1a, 1b).

D. fulvum (Greg.), Ralfs.

Ethmodiscus? sp.? Fragments of a very large disk are common at 550 feet, which probably belong to a species of this new genus constituted by Castracane.

Eucampia Virginica, Grun. Rare.
Eunotia monodon, Ehrb. Two varieties.
E. robusta (Ehrb.), Ralfs. Several varieties.
Eupodiscus Rogersii, Ehrb. Specimens are found with 3, 4 or 5 processes, but those with three are most frequent.
Eupodiscus sp.*?*
Goniothecium odontella, Ehrb.
G. Rogersii, Ehrb.
Grammatophora serpentina, Ehrb., var. Rare.
Hyalodiscus stelliger, Bailey. (*Podosira maculata*, W. Sm.)
Hydrosera triquetra, Wallich.
Mastogonia actinoptychus, Ehrb.
Melosira sulcata (Ehrb), Kutz.
Navicula crabro, Ehrb.
N. didyma, Ehrb.
N. elliptica, Kutz.
N. entomon, Ehrb.
N. forcipata, Grev.
N. gracilis (Ehrb.), Kutz.
N. Hennedyi, W. Sm.
N. major, Kutz. Rare.
N. permagna, Bailey.
N. prætexta, Ehrb.

NAVICULA SCHULTZEI, Kain, n. sp.

Valve broadly elliptical; intermediate free space expanded around the central nodule; striæ coarsely moniliform, convergent opposite the central nodule and radiate towards the apices. (Plate LXXXIX. Fig. 2).
N. viridis, Kutz. Rare.
Pleurosigma Virginiacum, Peticolas.
Pleurosigma sp. ? Fragments of a very large *Pleurosigma*, allied to *P. angulatum* are occasionally found.
Pseud-auliscus radiatus, Bailey.
Pyxidicula cruciata, Ehrb.

RHABDONEMA ATLANTICUM, Kain and Schultze, n. sp.

Valve narrow, linear elliptic; frustule with two median and two marginal septæ, the former more curved and conspicuous

than the latter; striæ transverse, fine. (Plate LXXXIX. Figs. 7, 7a).
Rhaphoneis amphiceros, Ehrb.
R. Belgica, Grun.
R. fluminensis, Grun.
R. scalaris, Ehrb.

The deposit is particularly rich in specimens of *Rhaphoneis*, and these present such variations of structure as to suggest the advisability of decreasing the number of species usually considered as belonging to the genus.
Rhizosolenia Americana, Ehrb.
R. styliformis, Brightw.
Sceptroneis Caduceus, Ehrb.
Stephanogonia actinoptychus, Ehrb.
S. polygona, Ehrb.
Stephanopyxis apiculata, Ehrb.
S. ferox (Grev.), Ralfs.
S. corona (Ehr.), Grun.
S. limbata, Ehrb. Rare.
S. Turris (Grev.), Ralfs.
Surirella Febigerii, Lewis.
Terpsinœ sp. ?
Triceratium Americanum, Ralfs.
T. condecorum, Brightw.
T. Fischerii, A. S.

TRICERATIUM KAINII, Schultze, n. sp.

Valve triangular with concave margins; striation moniliform, convergent towards the centre and intercepted by three costæ equidistant between the rounded angles and the unstriated centre. (Plate LXXXIX. Fig 5).
T. Marylandicum, Brightw.
T. obtusum, Ehrb.
T. robustum, Grev.
T. semicirculare, Brightw. *(Euodia Brightwellii*, Ralfs*)*. (Plate LXXXIX. Figs. 6, 6a).
T. spinosum, Bailey.
T. Solenoceros, Ehrb. Rare.
T. tessellatum, Grev.
T. undulatum, Ehrb.

In a future paper it is proposed to figure and describe several other new species peculiar to the deposit.